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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,089	09/19/2003	Michael A. Fetcenko	OBC-129	8443
7590 02/06/2007 Philip H. Schlazer Energy Conversion Devices, Inc. 2956 Waterview Drive Rochester Hills, MI 48309			EXAMINER PIGGUSH, AARON C	
			ART UNIT 2838	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE			MAIL DATE	DELIVERY MODE
3 MONTHS			02/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/666,089

Applicant(s)

FETCENKO ET AL.

Examiner

Aaron Piggush

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 08 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4-14 and 20-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-14 and 20-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of improperly amending it, wherein the phrase "when said ambient temperature falls below a first temperature" (see lines 5 and 6) should be underlined since it is added to the claim.
2. Claims 4 and 5 are objected to because of the following informalities: Claims 4 and 5 are dependent upon claim 2, which is a cancelled claim. To further prosecution, claims 4 and 5 will be treated as though they are dependent upon claim 1. Appropriate correction is required.
3. Furthermore, clarification is required as to where within the specification the first and second levels (noted in the amended or new claims) are disclosed. Previously, it seems as though the applicant referred to first and second values which have now been changed to first and second levels, wherein now the "first level" replaces the second value in the old claims and the second level replaces the first value in the old claims. It seems as though this could be simple terminology changes, however, clarification is still needed.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Gollomp (US 6,424,157).

With respect to claim 1, Gollomp discloses a method of operating a nickel-metal hydride battery during cold start weather conditions, comprising: providing the nickel-metal hydride battery (col 1 ln 26-30 and col 4 ln 52-57) having a first state of charge level; determining the ambient temperature (col 3 ln 64 to col 4 ln 3); and resetting the state of charge level of said battery to a second level when said ambient temperature falls below a first temperature (col 7 ln 63-67, col 4 ln 27-29, S121-S133 in Fig. 1, and col 3 ln 2-8). In this case, the ambient temperature affects the quiescent voltage, which in turn affects the SOC of the battery. Furthermore, it is well known that ambient temperature will affect the SOC of every battery wherein the battery is at least partially exposed to external sources (i.e. other heat-producing circuitry or the outside environment).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-7 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gollomp (US 6,424,157) in view of Bito (US 2002/0003417).

With respect to claims 4 and 5, Gollomp discloses wherein the level of said state of charge is affected by the ambient temperature (col 7 ln 63-67 and col 4 ln 27-29) and wherein the SOC can be calculated/set with another equation (S133 in Fig. 1), however, does not expressly disclose wherein the first value of said state of charge is greater than 70%, or wherein it is between 70% and 90%.

It has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to set the second level of the state of charge to be between 70% and 90%, so that the battery could be more efficiently used by giving it a correct SOC, taking into account the ambient temperature and its effects on the battery, while also keeping the range under 90% to avoid electrolysis and overcharging.

Bito discloses wherein the level of said state of charge is between 70% and 90% (seen in Fig. 3 when the battery is below approximately -5 degrees Centigrade down to approximately -35 degrees Centigrade), in order to provide a range where the battery can be heated more quickly when it is at a lower temperature, which results in a greater performance of the battery (i.e. fixing the problem of a lower potential when the battery is at a lower temperature).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the second level of the state of charge between 70% and 90% in the method of Gollomp, as did Bito, so that a more accurate SOC would be set while avoiding electrolysis and also so that the performance of the battery would be increased by heating the battery more quickly when it is at the lower temperature.

With respect to claims 6 and 7, Gollomp does not expressly disclose wherein the first level of said state of charge is less than 60%, or wherein it is between 40% and 60%.

It has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to a person of ordinary skill in the art at

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the time the invention was made to set the first level of the state of charge to be between 40% and 60%, so that the battery could be more efficiently used by giving it a correct SOC, taking into account the ambient temperature and its effects on the battery, while also keeping the range above 40% to avoid a failure due to a lack of power or damage from overdischarging.

Bito discloses wherein the second value of said state of charge is between 40% and 60% (para 0048, 0057, and 0007, and as seen in Fig. 3 when the battery is near approximately 10 degrees Centigrade), in order to provide a range where the battery can be safely charged and discharged during operation, including during regenerative braking (para 0007 and 0050), while avoiding damage from overcharging/overdischarging.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the first level of the state of charge between 40% and 60% in the method of Gollomp, as did Bito, so that a more accurate SOC would be set while avoiding battery failure from a low state of charge and also so that the performance of the battery would be increased by setting a range where the battery could supply or receive power (i.e. regenerative braking) while avoiding damage from overcharging/overdischarging.

With respect to claim 20, Gollomp does not expressly disclose the method further comprising recharging the nickel-metal hydride battery by regenerative braking.

Bito discloses recharging a battery in a vehicle by regenerative braking (para 0055 and 0050), in order to more efficiently use the power available to the system and keep the battery at a proper state of charge (i.e. the battery will be more likely to be able to supply energy when needed).

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At the time of invention, it would have been obvious to a person of ordinary skill in the art to include regenerative braking in the device of Gollomp, as did Bito, so that the power available to the system would be more efficiently used, the battery would be more likely to remain in a proper state of charge, and so that standard brake wear on the vehicle would be reduced (cost effective).

With respect to claims 21-23, Gollomp discloses wherein the first temperature is a low temperature (col 17 ln 35-47, col 22 ln 42-47, and col 4 ln 23-29), however, does not expressly disclose wherein the first temperature is less than or equal to -10 , -20 , or -30 degrees Celsius.

Bito discloses battery input/output control for a vehicle battery wherein the ambient temperature is less than or equal to -10 , -20 , or -30 degrees Celsius (as seen in Fig. 3), in order to help increase the available environments wherein the battery can function properly (even when the environments are at extreme temperatures).

At the time of the invention, it would have been obvious to include operation wherein the first temperature is less than or equal to -10 , -20 , or -30 degrees Celsius in the device of Gollomp, as did Bito, so that the battery could be used in a wider range of environmental conditions while keeping the performance at an acceptable level by making adjustments to the battery's temperature and SOC (wherein the level control will help adjust the SOC of the battery to be more accurate for certain extreme environments).

With respect to claims 24 and 25, Gollomp does not expressly disclose wherein the state of charge level of the battery is reset to the first level when the ambient temperature rises above a second temperature or wherein the first temperature is equal to the second temperature.

Although, and as mentioned before, it is well known that as the temperature changes, the SOC will be affected. Specifically, as the temperature increases, the maximum possible supply voltage of the battery increases (up to a point), and therefore, the SOC of the battery will be lower since the battery voltage would be farther from the maximum possible supply voltage (or would have a greater range between a full and an empty charge). This is also true in the opposite respect wherein as the temperature decreases, the maximum possible supply voltage of the battery decreases, and therefore, the SOC of the battery will be higher since the battery voltage would be closer to the maximum possible supply voltage (or would have a smaller range between a full and an empty charge).

Bito discloses wherein if the temperature is below a first temperature, then the state of charge is set to a second level, and if the temperature is above a second temperature, said second temperature being greater than or equal to said first temperature, then the state of charge is set to a first level (all of which is noted in Fig. 3, wherein as the temperature increases, the state of charge decreases, and para 0012 and 0027), in order to heat the battery more quickly so that the battery's performance can be increased. Furthermore, Bito discloses wherein said second temperature is equal to said first temperature (as can also be seen by any chosen temperature on the graph in Fig. 3), in order to provide a point wherein the above actions pertaining to setting the state of charge to a higher or lower value can be effectively carried out.

It is additionally noted that the ambient temperature is used in the Gollomp reference and the battery temperature is used in the Bito reference. The combination of the references is seen as reasonable because the ambient temperature affects the battery's temperature, and the

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battery's temperature affects the ambient temperature, both of which affect the state of charge of the battery in the same manner.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include setting the SOC to a first level when the ambient temperature is above a second temperature, which is equal to the first temperature, in the method of Gollomp, as did Bito, so that the battery's temperature can be raised more quickly, which would result in an increase in battery performance, and so that the battery could be more efficiently controlled in charging/discharging while avoiding any overcharging/overdischarging resulting from an incorrect SOC calculation.

5. Claims 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gollomp (US 6,424,157) in view of Bito (US 2002/0003417) and Young (US 6,392,388).

With respect to claims 8, 12, and 13, Gollomp discloses a method of operating a nickel-metal hydride battery, comprising: providing said nickel-metal hydride battery (col 1 ln 26-30 and col 4 ln 52-57), said battery being at an ambient temperature of a low value (col 17 ln 35-47, col 22 ln 42-47, and col 4 ln 23-29); and converting a portion of the chemical energy of said battery to thermal energy (col 4 ln 23-29 and abstract ln 11-15). Furthermore, when a chemical battery (such as Ni-MH) is connected to a circuit, which causes current to flow, some of the chemical energy of said battery is always converted to thermal energy when discharging due to the lack of an ideal system where no energy is lost to heat (i.e. current flowing through the wire or other components will generate heat).

However, Gollomp does not expressly disclose wherein said battery is at an ambient temperature of -20 degrees Centigrade, -25 degrees Centigrade, or -30 degrees Centigrade or

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less, or wherein the battery is electrically coupled to a load after converting a portion of chemical energy to thermal energy.

Bito discloses wherein a battery is at a temperature of -20 degrees C, -25 degrees C, and -30 degrees C or less (as seen in Fig. 3), and converting some of the battery's chemical energy to thermal energy (para 0027), in order to increase the low temperature of the battery, which results in a greater performance of the battery (i.e. fixing the problem of a lower potential when the battery is at a lower temperature).

Young discloses applying a short circuit across the terminals of a battery for a finite period of time (col 1 ln 35-44, no. 24 in Fig. 1, and col 3 ln 49-50) which would convert a portion of chemical energy to thermal energy (col 8 ln 31-44, and note the description of chemical to thermal energy above), and after applying said short circuit, electrically coupling said battery to a load (no. 14 in Fig. 1, no. 40-52 in Fig. 2), in order to heat up the batteries to make them operate in accordance with their intended functions (such as vehicle starting) even when the ambient temperature is low (col 1 ln 10-20).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to provide the battery at an ambient temperature of -20 , -25 , or -30 degrees C or less in the method of Gollomp, as did Bito, and to electrically couple the battery to a load after converting a portion of chemical energy to thermal energy in the method of Gollomp, as did Young, so that the battery could be used in a wider range of environmental conditions while keeping the performance at an acceptable level by making adjustments to the battery's temperature and SOC and so that the battery can be heated up to be closer to optimum operating

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temperatures before it is used with a load (i.e. vehicle starter), which would allow the battery to perform its required functions even in low ambient temperatures.

With respect to claim 9, Gollomp discloses wherein said converting step decreases the charge transfer resistance of said battery (col 8 ln 50-58, col 17 ln 35-47, and col 22 ln 42-47). Additionally, it is well known that the battery's resistance will be greater at lower temperatures because the colder temperatures make diffusion more difficult, and therefore, heating the battery will increase the temperature and decrease the resistance.

With respect to claim 10, Gollomp discloses wherein said converting step comprises the step of discharging the battery (col 4 ln 23-29 and abstract ln 7-15). Also, see rejection above for claims 8 and 9, wherein it is noted that as the battery is discharged, current will flow causing an increase in the temperature of the battery.

With respect to claims 11 and 14, Gollomp and Bito disclose a discharging step, however, do not expressly disclose wherein said discharging step comprises the step of applying a short circuit across said battery for a finite period of time, or wherein that period of time is 10 seconds or less.

Young discloses wherein a discharging step is carried out by applying a short circuit across a battery for a finite period of time (col 1 ln 35-44, no. 24 in Fig. 1, and col 3 ln 49-50), in order to heat the battery to an acceptable temperature and overcome the deficiencies of batteries operating at low temperatures (such as lacking the ability to start a vehicle engine).

It has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to a person of ordinary skill in the art at

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the time the invention was made to apply the short for 10 seconds or less, so that the battery temperature could be increased quickly (to reach a more optimum performance temperature) while avoiding to great of a temperature increase in the battery or the circuitry, either of which could result in damage to the battery or the system itself.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply a short circuit across a battery for 10 seconds or less in the method of Gollomp, as did Young, so that the battery could reach a highly functional temperature in a shorter amount of time (without using additional expensive circuitry components) while also avoiding too high of a temperature on the battery or on the short circuit (which could cause damage to the battery or the wiring).

Response to Arguments

6. Applicant's arguments filed November 8, 2006 have been fully considered but they are not persuasive.

With respect to claim 1, applicant argues that Gollomp does not set a state of charge based on ambient temperature, but instead continuously computes and updates SOC as the result of recent and on-going discharge and charge experience as corrected by ambient conditions.

Examiner disagrees for the following reasons: Computing and updating the SOC is reasonably interpreted to have the same meaning as resetting, and furthermore, correction by ambient conditions is also seen as a reasonable interpretation of "being based on ambient temperature".

With respect to the argument concerning Bito in the 103 rejections, the applicant argues that the combination of Bito and Gollomp has no motivation in the references or in the

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knowledge generally available to one of ordinary skill in the art. The applicant also mentions that one of ordinary skill in the art would determine that the battery temperature, not ambient temperature, is most directly related to battery performance.

Examiner disagrees for the following reasons: Please see the reasons for combining in the rejections above (which are still seen as reasonable). Also, it should be noted that although the battery temperature might be most directly related to battery performance, the ambient temperature greatly affects the battery's temperature, and the battery's temperature affects the ambient temperature, both of which affect the state of charge of the battery in the same manner.

With respect to claim 8, applicant argues that the combination of references does not teach/suggest all the limitation of amended claim 8. This argument is seen as moot in view of the rejection presented above (now with the Young reference).

Furthermore, the rejection of claims 11 and 14 with the Young reference are also seen as reasonable, especially in view of the motivation provided above (including the motivation for the use of Young in the rejection of claim 8 since claims 11 and 14 are dependent upon it).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Piggush whose telephone number is 571-272-5978. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AP

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A handwritten signature in black ink, appearing to read 'G. Laxton', with a stylized flourish at the end.

Gary L. Laxton
Primary Examiner
Art Unit 2838

1/29/2007